Electric Furnaces, Power Plants and Metallurgical Development in South America.

The countries of South America possess vast resources for the development of hydro-electric power. In support of such a development efforts are being made to cheapen the cost of fuel for transportation and other purposes, coal being not only very high priced but also difficult to obtain, and to extend railways so that interior sections may be made accessible.

In Argentina, the Iguazu of the northeastern corner of the country and the great group of water power resources in northwestern Patagonia, Neuquen, Rio Negro, and Chubut are capable of producing enormous quantities of hydro-electric power. Due to their remote locations, they have attracted less attention than the limited resources of Cordoba, Tucuman and Mendoza.

The falls of the Iguazu afford the best single resource in Argentina and one of the best in the world. Accordingly, the Argentine government, under the Direccion General de Navegacion y Puertos, has inaugurated a survey preliminary to the construction of a power plant there. It is reported that an international power plant, with a capacity of 150,000 horse power, will be erected jointly by the governments of Argentina, Uruguay and Brazil. At present, La Compania Hidro-electrica de Tucuman (English) is the only power plant established in Argentina. La Empresa de Luz y Fuerza (German) has a concession for the construction of a power plant at Mendoza. Work on this plant was begun several years ago, but was indefinitely suspended because of a dispute over the concession. The municipality of Mendoza is to construct a power station at the falls of the Rio Blanco and to build an extension tunnel and aqueduct system costing $5,600,000.

Dr. Julius Klein, the United States commercial attache to the Argentine Republic, says that power plants could well be established near Salta in the northwest, near Iguazu, and in the Rio Negro district, to serve Bahia Blanca of the southeast, and that there will be a great demand for electric power for supplying the various railroads which contemplate the electrification of their lines. At the present time the Argentine railways use three-fourths of the coal consumed in Argentina.

Brazil has extensive plans for the development of interior transportation, including the construction of power plants for industries and the electrification of railways. The Director of Public Lands and Colonization, Department of Public Works, Porto Alegre, Rio Grande de Sul, called last August for bids for the erection of a power plant of 30,000 horse power on the River Jacuhy. The concession is for 30 years, at the expiration of which time the state will take over the installations. La Empresa Electrica de Jundiahy and the Sao Paulo Electric Company have ten-year contracts for furnishing 8,400,000 kilowatt hours of power for the Paulista Railway, which is now being electrified. The government-owned line from Barra to Pirahy of the Central Railway of Brazil is also to be electrified. Rio de Janeiro is to have a 270,000 horse power plant erected in the near future by an internationally organized company having American interests, according to Dr. Julius Klein, United States commercial attache to Buenos Aires. Two hydro-electric stations are to be built and an electric street car service inaugurated in the vicinity of Rio de Janeiro.

The Itabira Iron Ore Company, Ltd., recently secured a concession from the Brazilian government to construct and exploit high temperature furnaces, a steel factory, and reducing apparatus, etc., and plans to electrify the Victoria-Minas Railway, for which an electric power plant will doubtless be constructed. An electric smelting plant, the first of its kind in South America, will be built in Ribeiro Preto, province of Sao Paulo, by the Compania Electrica Metallurgica Brazileira. The construction of the mill will be started as soon as the American contractors can get their engineers on the ground. The mill will be 75 miles from the mines of iron ore in the province of Minas Geraes.

Bolivia in its present stage of development is a country of mines, though other resources exist. There are only three or four towns of any importance and population, and the present field for street railroad and power transmission material is restricted. The greatest hydro-electric resources are those in the vicinity of La Paz, Tres Cruces and Colquechaca and plans for their exploitation have been made. The three initial power plants will entail an expenditure of $10,000,000 and will require large quantities of other machinery and electrical accessories in addition.

The La Paz-Yungas electric railroad is now being constructed by the Bolivian government with funds largely raised through a $2,400,000 loan made in the United States a few years ago. This line and the Corocoro copper mines, whose directors are considering the electrification of their plant and the city of La Paz itself, for lighting, heating, cooking and industrial purposes, will utilize power supplied from the Yungas River near La Paz.

The progressive mining section of Tres Cruces requires power and heat and needs two tramways operated by electricity to connect Oruro and Cochabamba. The Cochabamba-Valparaiso Railroad needs capital to complete the electrification of its system and to reconstruct its lines to meter width.

The wealthy mining district of Colquochaca lacks electric power and heat, and an extension of the raiyway to Uncia, another mining center, is urgently needed.

An electric line known as Cochabamba, Vinto, Cliza tramway, controlled by local capital, at Cochabamba, has been completed for upwards of 45 miles and an additional mileage to a total of 57 miles is under construction.

Electric lighting plants exist in about a dozen towns and tramways in three or four.

The Bolivian and General Enterprise Company operates the tramways, electric lighting and tele-

phone systems of La Paz, a city of 100,000 population, the capital of Bolivia. This company is owned almost entirely by the French munitions firm of Creusot and Schneider. The power is hydro-electric and the tramway line is approximately three miles in length, operated with eight cars of American make.

La Sociedad de Luz y Fuerza Electrica de Cochabamba, a local firm capitalized at $2,000,000, operates the previously mentioned interurban line terminating in Cochabamba and also furnishes light and power to the towns along the line — Arami, Vinto, Puncta, Tarata and Cliza. The hydro-electric statilon on the Chocaya River supplies the power.

Sucre, the capital city, sadly lacks modern transportation facilities. La Empresa de Luz y Fuerza Electrica de Sucre has a monopoly of the light and power supply of the city. La Empresa de Luz y Fuerza de Oruro, a hydro-electric development, has lighting and power privileges. It is a local concern. A mule tramway still exists in this town of 23,000 persons.

Tarija and Potosi have hydro-electric light and power, the former from Erquis, six miles distant, and the latter from 32 reservoirs built by the Spaniards in the 16th century on the hills above the city.

Hydro-electric power is beginning to be utilized by the tin and copper mines of Bolivia. The Guggenheims of New York have acquired rights to three tin mines in the department of La Paz, consisting of more than 4,000 hectares. Water and power rights to some six streams in the vicinity of the mines have been secured and a hydro-electric power plant is to be built, but the site has not been decided on. The installation of a smelting plant run by electricity is under consideration. The company plans to found a town below the mines and construct an electric tramway to it.

The Bolivian government has been for some time contemplating the electrification of all railways and has declared as public domain the waters of such rivers as are capable of being used for the development of power. The Jafe de la Seccion de Ferrocarriles del Ministerio de Fomento has charge of these projects.

In Peru, most of the imporant cities and towns have electric light and power systems. Tramway systems traverse the streets of Lima, Callao, and towns adjacent thereto, and are also established at Arequipa. La Empresa de Telefonos Arequipa y Mollendo operate the local and long distance telephone system of Arequipa and surrounding district.

Las Empresas Electricas Asociadas de Lima (Lima Light, Power and Tramways Company), controlling electricity and gas franchises in and adjacent to Lima, as well as more than 86 miles of tramway, is the most important public utility company in Peru. The Peruvian Telephone Company (partly local and partly British capital) furnishes the telephone service for Lima, Callao and nearby places.

La Sociedad Electrica de Arequipa, Ltd., a local company, furnishes electricity for light and power to Arequipa, the metropolis of southern Peru, and its environs. El Tranvia Electrico de Arequipa, Ltd., controls the traction service of that city; W. R. Grace & Company, as agents for the Bondholders' Syndicate, operates the line.

Various sections of the Peruvian railways are being electrified as power for that purpose is provided, especially the interurban lines near Lima. The last division of the Southern Railway of Peru (from Mollendo to Arequipa, Puno, Cuzco and from Gaqui, beyond Lake Titiacca, to La Paz, Bolivia), is an electric six-mile line.

The mines or Peru are beginning to appropriate the hydro-electric resources of the Peruvian Andes. The Cerro de Pasco Copper Corporation of Cerro de Pasco, province of Junin, Peru, is now installing a large up-to-date smelter at Oroya and providing modern housing and other facilities for its workingmen, all of which will consume considerable electric power, which is likewise being provided.

A vanadium ore-reducing plant for the mines of Minasgra, Peru, is to be built at Jumasha, Peru, by the Vanadium Corporation of America, of Pittsburgh, Pa. A hydro-electric plant capable of furnishing 20,000 kilowatts power for treating the ore is to be constructed about 25 miles from Jumasha.

In Ecuador, public utility development has been very slow. In Quito, the capital, there is an electric tramway line installed by J. G. White & Company. This, together with the Quito Electric Lighting & Power Company, which furnishes light and power, is owned by the Ecuador Corporation, a British company. Guyaquil, the largest city and chief port, has two street car lines and electric lighting. The municipality of Portoviejo is to erect an electric light plant.

Chile has vast hydro-electric resources, which have been but slightly developed. German and British capital, chiefly, has been invested to provide public utilities in Chile.

The most definite development project in Chile at the present time is that provided by a $35,000,000 loan by the Chilean government, $10,000,000 of which has been appropriated for the electrification of the railway from Santiago to Valparaiso, via Casablanca. The electric generating station is to be located on the Aconcagua River about 30 miles from Llai-Llai. In fact, the Chilean government will electrify all the state railways, and plans are in charge of Senores Rafael Edwards, the electrical consulting engineer for the state railways, and Ricardo Solar, a civil and electrical engineer of prominence.

Moreover, an internationally organized company (Anglo-Chilean-Americano) in Valparaiso plans to construct a 100,000 horse power plant for supplying electric lighting and power to that region.

The Antofogasta-La Paz Railway, a British-owned line and one of the largest in the nitrate region of northern Chile, is to electrify its lines at a cost of $7,500,00, which project will entail the erection of a power plant.

A number of large Venezuelan cities and towns have electric lighting and tram service. The Caracas Electric Company utilizes the 111 feet rapids in the Guare River for the generation of power. The torrential Chama River near Merida is likewise useful. The Caroni Falls will be harnessed to provide the necessary hydro-electric power for the newly-planned electric railway from San Felix on the Orinoco River to the Guasipati gold fields.